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Journal of the Society of Arts.

FRIDAY, APRIL 4, 1856.

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EXAMINATIONS FOR CANDIDATES FROM INSTITUTIONS ASSOCIATED WITH THE SOCIETY OF ARTS.

Some additions having been made to the following statement, it is considered advisable to republish it for the information of the Institutions. A broadsheet, for suspension in the Institutions, and smaller copies for distribution, have been sent round to each Institution in Union. A copy of the declaration of confidence in this movement, signed by a large number of employers of labour, in all parts of the kingdom, and in every branch of industry, stating that they are prepared to regard as testimonials worthy of credit the certificates of the Society, has also been sent. It is particularly requested that the Declaration be suspended under the broadsheet:—

NAMES OF THE EXAMINERS.	SUBJECTS.	SUBDIVISIONS, TEXT BOOKS, AND LIMITS.
Mr. Ball Rev. Dr. Booth, F.R.S. Mr. Glaisher, F.R.S. Mr. J. G. Jay	MATHEMATICS	ARITHMETIC, BOOK-KEEPING, ALGEBRA, EUCLID, MENSURATION. Barnard Smith's Arithmetic (*Bell and Daldy*), or Colenso's Arithmetic (*Longmans*) to end of Proportion. Book-keeping by Double Entry, Irish School Series (*Groombridge*). Colenso's Algebra (*Longmans*), to end of Quadratic Equations. Euclid, books I., II., III. Tate's Mensuration (*Longmans*), or Mensuration, Irish School Series (*Groombridge*), Kelly's Elements of Book-keeping (*Simpkin and Co.*), Morrison's System of Book-keeping (*Griffin*).
Rev. Dr. Booth, F.R.S. Mr. C. Brooke, M.A., F.R.S. Professor Goodeve, M.A. Rev. Bath Power, M.A.	MECHANICS	STATICS. THE PRINCIPLES OF MECHANISM AND THEIR APPLICATION TO SIMPLE MACHINES, TO THE STEAM ENGINE, &c. Fowler's Mechanics (*National Society*). Galbraith and Haughtons' Manual of Mechanics (*Longmans*). Lardner's Hand-book of Mechanics (*Walton and Maberly*). Bird and Brooke's Elements of Physics (*Churchill*).
Professor Solly, F.R.S. Dr. Stenhouse, F.R.S.	CHEMISTRY	ORGANIC AND INORGANIC. Wilson's Chemistry (*Chambers' Educational Course*). Fownes's Manual of Chemistry (*Churchill*).
Dr. W. B. Carpenter, F.R.S. Dr. Bence Jones, F.R.S.	PHYSIOLOGY	Carpenter's Manual (*Churchill*). Dr. Southwood Smith's Physiology of Health (*Charles Knight*).
Dr. W. B. Carpenter, F.R.S. Professor Henfrey, F.R.S.	BOTANY	GENERAL STRUCTURE, AND SYSTEMATIC BOTANY. Lindley's School Botany (*Longmans*). Flowers of the Field, by Rev. C. Johns (*Christian Knowledge Society*). Henfrey's Rudiments of Botany (*Van Voorst*).
Mr. James Caird Mr. J. C. Morton	AGRICULTURE	SUCH A GENERAL KNOWLEDGE OF FARM PRACTICE AND OF THE MANAGEMENT OF LIVE STOCK AS MUST TO SOME EXTENT, AT ANY RATE, HAVE BEEN OBTAINED IN THE FIELD. Low's Elementary Agriculture (*Longmans*), Johnston's Agricultural Chemistry (*Blackwood*), Mr. Pusey's Papers on the Progress of Agricultural Knowledge, in the 26th No. of the Royal Agricultural Society's Journal.
Rev. Dr. Booth, F.R.S. Rev. S. Clark Dean of Hereford	GEOGRAPHY	POLITICAL AND PHYSICAL. Cornwell's School Geography (*Simpkin and Co.*) Sullivan's Geography, Irish School Series (*Groombridge*). Milner's Geography (*Tract Soc.*) Guyot's Earth and Man (*Parker*). Mrs. Somerville's Physical Geography (*John Murray*). W. Hughes' Physical Geography (*Longmans*). School Physical Atlas (*Keith Johnston*, or *National Society*).
Professor Brewer Rev. F. Temple	ENGLISH HISTORY.	Ince's Outlines of English History (*Gilbert*). A more extensive knowledge of the following reigns:—Alfred, William I., John, Henry VIII., Elizabeth, and the Stuarts to the end of the reign of Anne.
Professor Brewer Rev. Dr. Elder Rev. W. Elliott Rev. F. Temple	ENGLISH LITERATURE: ENGLISH COMPOSITION: WRITING FROM DICTATION	Bromby's English Grammar (*Simpkin and Co.*) Chaucer's Prologue to the Canterbury Tales. Spenser's Fairy Queen, First Book. Shakespeare: King John, Henry IV., Henry V., Lear, Hamlet, Macbeth, Othello. Bacon: First Book of the Novum Organum; the Preface, Fifth and Seventh Books of the Advancement of Learning. Milton's Paradise Lost. Dryden: Virgil's Æneid, Six Books. Spectator. Pope: Poetical Works. Butler's Analogy. Wordsworth: Excursion, or Lyrical Ballads. Tennyson. *Candidates may take up any two authors of the above.*
Professor Browne Mr. Sandford	ROMAN HISTORY: LATIN	To end of Punic Wars, or from that date to the death of Aug. Cæsar. Dawson Turner's Outlines of Roman History (*Parker*). Cæsar, First Book. Sallust, Jugurthine War.
Professor Brasseur	FRENCH	Grandeur et Décadence des Romains, par Montesquieu, jusqu'à la fin du Chap. II. La Henriade, jusqu'à la fin du Chant II.
Dr. Bernays	GERMAN	Treue bis in den Tod, by Nieritz. Schiller's Jungfrau von Orleans.
Mr. John Bell and Mr. F. S. Cary.	FREE HAND DRAWING IN OUTLINE FROM OBJECTS.	

RULES.

The Examinations will commence at 10 A.M., on Tuesday, the 10th of June, 1856, at the Society's House in the Adelphi.

Candidates who propose to offer themselves for Examination, must give written notice of their intention to the Secretary before the 31st of May, 1856. Each Candidate must state, the Institution to which he belongs, his age, his employment, and by whom employed, and the subjects in which he desires to be examined.

All Candidates will be required to possess a competent knowledge of Writing and Spelling.

⁂ The Examiners define good writing as a bold hand in which *all* the letters are distinctly and completely formed.

Every Candidate will be expected to come prepared in two subjects (not subdivisions of subjects) at least.

The Examiners in *Science* merely recommend the text-books set down. They will be prepared to recognise knowledge however obtained.

The Examination will be conducted by written papers and by oral examination.

The Examiners will award Certificates of Three Classes.

First Class Certificates will be awarded only to a high degree of excellence.

Should the proposed Examinations receive the approbation and support of those classes for whose benefit they are undertaken—employers and candidates for employment—the Council of the Society of Arts will be prepared to take into their consideration the propriety of extending the advantages of the system to the more remote parts of the country.

PRIZES FOR 1856.

Mr. R. Stephenson, M.P., Vice President of the Society of Arts, has placed Ten Guineas at the disposal of the Council, who have determined to award it to the Candidate who shall pass the best examination in Mathematics and Mechanics, and obtain a First-class Certificate in each.

Mr. George F. Wilson, F.R.S., gives a prize of Ten Guineas, to be awarded to the Candidate who shall pass the best examination in Chemistry, and obtain a First-class Certificate therein.

Mr. Mechi gives a prize of Ten Guineas, to be awarded to the Candidate who shall pass the best examination in the Principles of Agriculture, and obtain a First-class Certificate therein.

Mr. Samuel Morley has placed Ten Guineas at the disposal of the Council, who have determined to award it to the Candidate who shall pass the best examination in Physical Geography, and obtain a First-class Certificate therein.

Mr. Charles Wentworth Dilke, Vice President of the Society of Arts, gives a prize of Ten Guineas, to be awarded to the Candidate who shall pass the best examination in English History, and obtain a First-class Certificate therein.

Mr. G. N. Hooper gives a prize of Ten Guineas, to be awarded to the Candidate who shall pass the best examination in French, and obtain a First-class Certificate therein.

Mr. Peter Graham gives a prize of Ten Guineas, to be awarded to the Candidate who shall exhibit the greatest proficiency in Free Drawing in Outline, and obtain a First-class Certificate therein.

Mr. John Wood, the Chairman of the Board of Inland Revenue, has placed two appointments *annually*, in the Surveying Department of the Excise, at the disposal of the Council of the Society of Arts.* No Candidate will be recommended for these appointments who shall not obtain *Second-class Certificates, at least*, in Mathematics, Chemistry, English Composition, and Writing from Dictation.

The Society of Arts will give a prize of Twenty-five Guineas to that Candidate who shall be recommended to the Council by the Board of Examiners for General Excellence in the Examinations.

By order,

P. LE NEVE FOSTER, Secretary.

Society's House, Adelphi, London, March 22, 1856.

SIR JOHN HERSCHEL AND THE SOCIETY OF ARTS EXAMINATIONS.

The following letter has been addressed by Sir J. Herschel to the Chairman of Council:—

"Collingwood, March 19.

"Sir,—I cannot have the smallest objection to stating the grounds on which I have subscribed to the declaration of confidence in the certificates of proficiency about to be awarded by the Society of Arts to the young men who offer themselves for examination as proposed in the circular accompanying it. It cannot but be of very great importance to those who have situations to fill up in the several departments of active life to obtain a knowledge, independent of the partial opinions of recommending friends, of the positive qualifications of the young persons who may offer themselves as candidates for such situations, in the immense majority of cases when such tests of merit as university honours or distinctions of a similar kind are out of the question. This is a want on the part of the public as yet unsupplied, and the example of what is being attempted in the departments of the civil as well as military service of the country may, I think, very advantageously be followed in commercial and industrial pursuits of a private nature, and I think the Society of Arts, by volunteering the initiative in undertaking this duty, is doing good service to the country. My confidence in the fairness and impartiality of the awards is based on the publicity of the whole proceeding, on the high character of the Society, and on the list of examiners, which comprises many names which I consider as guarantees for the rectitude and uprightness of their awards, and for the reasonable conduct of the examinations themselves in reference to the objects to be attained.

"I have the honour to be, Sir,

"Your obedient servant,

"J. F. W. HERSCHEL.

"The Rev. J. Booth, Chairman of the Council
of the Society of Arts."

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* The following are the rules laid down by the Commissioners with respect to the qualifications of candidates for admission into the surveying branch of the Revenue:—

The candidate must, on entering the service, be not less than nineteen, nor more than twenty-five years of age. A baptismal certificate, or other satisfactory evidence, will be required.

He must be healthy and active, and without any bodily infirmity. Of this a medical certificate will be required.

He must not be encumbered with debts; and must be unmarried, and without family, and of respectable character; and he will not be allowed to marry until he attains the rank of ride officer.

He must understand arithmetic, so as to work out sums in the rules of addition, subtraction, multiplication, and division, both in common arithmetic and in vulgar and decimal fractions, reduction, proportion, practice, and interest. He must be able to write a good hand, and correctly and fluently from dictation; and have a competent knowledge of book-keeping by double entry.

He will undergo an examination in the above-named subjects, and if approved will be placed under the instruction of an Excise officer for at least six weeks; at the expiration of which period, if he be found qualified to perform the duty of an officer, he will be certified for accordingly, and his salary will commence.

CLASS BOOKS FOR INSTITUTES.

The Council have much pleasure in publishing the following letter:—

Committee of Council on Education,
Council-office, Downing-street, London,
March 25th, 1856.

Sir,—In reply to your letter of the 26th December, 1855, and to a further letter of the 22nd ult., explaining the object of a deputation from the Council of the Society of Arts, which had waited upon the Lord President, to pray that the evening classes of Mechanics' Institutes, when such classes were of a scholastic character, might be allowed to obtain books and apparatus, through the Committee of Council, upon the same terms as schools under inspection, I am directed by the Lord President to state that, he is prepared to allow such classes to have the privilege of purchasing the books and apparatus which, for the time being, may be upon the lists issued by the Committee of Council, through the agency established by their lordships, if the members find it to be for their advantage to do so.

The secretary of the Institute should, in each case, correspond directly with the Committee of Council, but with the application he should file a certificate from yourself, stating that the Institute is in union with the Society of Arts, and that the Council of the Society recommends its application.

It is understood that no classes will be recommended to the Committee of Council except those in which regular instruction is the characteristic feature; that the classes will be open to the visits of her Majesty's Inspectors; that, if scientific apparatus be applied for, a competent lecturer will be engaged, *i.e.*, that the class will not depend for its scientific instruction upon itinerant lecturers alone; lastly, that the premises and furniture will be reasonably convenient for the purpose.

The lists, both of elementary school books and of scientific apparatus, are at this time undergoing revision, for the purpose of being greatly extended.

The forms in use will also require to be slightly modified, to suit applications from the classes in question.

The revision of the lists is a work of great labour, and will not, probably, be completed for some considerable time.

It would not be advisable to admit a new class of cases until the new lists are completed and in use. The old lists would much more restrict the power of selection.

I am, therefore, to request that, at present, no steps be taken by the Council of the Society upon this letter. As soon as the lists are completed, the Lord President will cause you to be informed that the Committee is prepared to receive applications.

I have the honour to be, Sir,
Your obedient servant,
R. R. W. LINGEN.

UNION OF COLONIAL INSTITUTIONS.

Meeting of Council, 2nd April, 1856.

At the meeting of Council held on the 2nd inst., a letter was read from the Secretary to the Fredericton Athenæum, accompanied with the subjoined extract from Minutes and Report of a Committee, requesting that that Institution might be taken into Union with the Society of Arts on the basis of the terms laid down by the Council on the 19th of December, 1855, and published in the *Journal* of the 21st of the same month, when it was

Resolved—That the Fredericton Athenæum be taken into Union, in accordance with the Resolution of the Council of 19th December, 1855.

King's College, Fredericton, Jan. 28, 1856.

At a meeting of the Fredericton Athenæum, held in the College Library, Jan. 28, the Hon. Chief Justice Carter, the President, in the Chair, the Secretary informed the Society that he had received by mail from England, No.161, vol. iv., of the *Journal of the Society of Arts;* that the said Journal contained an announcement from the Society of Arts (which was read) signifying that they desired to connect themselves more closely with Colonial Institutions, &c. Whereupon, on motion, the subject was referred to a select committee, consisting of Dr. Jack, Professor of Mathematics and Natural Philosophy, J. Wilkinson, C.E., and Dr. Robb, Professor of Chemistry and Natural History in King's College.

On Feb. 25th Dr. Robb, on behalf of the committee, submitted the following Report upon the subject above referred to, and which Report was unanimously adopted: The Secretary was, moreover, instructed to carry out the views expressed in the Report, and to correspond, when required, with the Secretary of the Society of Arts:—

Report.

The committee appointed at the January meeting to report upon the proposed connection with the London Society of Arts, beg to state that they have given the subject consideration, and would now recommend that the offer of connection of the Fredericton Athenæum with the Society of Arts be thankfully accepted, upon the terms proposed in the letter.

These terms are, the annual payment of two guineas to the said Society of Arts; and the return, therefore, may be stated as follows:—

1. This connection brings the colony and colonial institutions into a more near and friendly connection with the parent state.

2. It brings a young and willing Society into contact with one thoroughly established in the confidence of the world; one which is both able and desirous to direct the path of young colonial institutions into the most useful and practical course of operations.

3. It permits of the purchase of books and apparatus in London on the most favourable terms. Although the Athenæum has not done anything in this way as yet, the proposed connection may lead to a revisal of our present plan, whereby the Society may be made more directly useful.

4. It gives position and advantages to such of our members as may be in London in the course of the year.

5. It entitles us to a copy of the valuable Journal of the Society, now published once a week, and which would otherwise be charged 17s. 4d. per annum.

This may lead to our taking other journals.

6. Although the Fredericton Athenæum has deviated, somewhat unavoidably, from its original plan, which was more especially limited to provincial objects, and has now become rather a literary than a scientific association; and, although for the reasons just alleged, it may be little able to contribute to the advancement of science or art by the efforts of its members, nevertheless, the Fredericton Athenæum deems it an honour to be permitted to aid in any way in carrying out the applications of science to art, and the beneficent designs contemplated by the London Society for the Encouragement of Arts, Manufactures, and Commerce. Respectfully submitted.

(Signed) J. ROBB,
W. B. JACK,
J. WILKINSON. } Committee.

SIXTEENTH ORDINARY MEETING.

Wednesday, April 2nd, 1856.

The Sixteenth Ordinary Meeting of the One Hundred and Second Session was held on Wednesday, the 2nd inst., Sir John Rennie, F.R.S., in the chair.

The following Candidates were balloted for and duly elected Ordinary Members:—

Batt, Henry
Kaye, Horace
Lester, Lester
Lyte, F. Maxwell

The following Institution has been taken into Union since the last announcement:—

412. Haley Hill (near Halifax), Working Man's College.

The lecture delivered was

ON IMPROVED APPARATUS FOR TEACHING MECHANICS IN SCHOOLS.

By the Rev. Professor Willis, F.R.S.

The Professor said he proposed to give a short account of the experiments that he had for a long time past been fighting with, upon apparently trivial purposes and with perhaps small results. But it was probably known to many persons that circumstances had placed him in a double position, and that most of these things were done by those whom accident had placed in such a position, viz., that all his life, from his boyhood, he had been in the practice of constructing various kinds of mechanical apparatus. He had always been fond of carpentering, and work of that sort, and had followed up that bent of his inclination; at the same time fortune enabled him to obtain the advantages of an university education—that is, an education in the higher branches of mechanical science—and, therefore, by a fortunate concurrence of these two circumstances, he might have some little claim for being able to make some improvements in the apparatus commonly employed to illustrate that science. He had always been in the habit of constructing his own apparatus for the illustration of the subjects he had been accustomed to lecture upon. He did not mean to say that he could cut down a tree, saw it into planks, and plane them up; but what he meant was, he employed workmen to construct from his own design, in separate pieces, which separate pieces he put together himself in the carrying out of that design; and by this means he had succeeded in reducing to a practical shape many of those things for which people for the most part were principally dependent upon the mathematical instrument maker. He might here be allowed to express the hope that many mathematical instrument makers had attended that evening; he begged of them to copy and make what use they liked of what he might bring before them, provided they would mention the source from whence they derived their hints, trifling though they might be. He might mention at the outset that, some time since, he had the honour of receiving a commission from the Board of Trade, to pay some attention to the construction of a better sort of apparatus for the purpose of illustrating the elementary principles of the mechanical sciences, than that which had hitherto been employed in the ordinary schools throughout the country, and it was for that reason, perhaps, that he had been induced to bring this subject so prominently before the Society, and that might be an apology for the exhibition of the many things which were arranged on the table before him. He was not going to propound the question whether Archimedes ever lectured or made any apparatus to illustrate his views, but he was speaking now of apparatus which was suited to the lecture-room and to the lecturer, for the illustration of the subject of which he treated. We knew, from the earliest history of science, that there had always existed two kinds of mechanical or investigating philosophers. One class of these was so highly gifted with the power of reasoning, that when they applied reasoning from deductions that arose from natural philosophy, they were so content with the deductions they arrived at, that they did not take the trouble to try whether in practice they were correct. He had no doubt that the philosopher who discovered that if a certain weight was suspended from the short arm of a lever, and half that weight was suspended upon an arm of the lever twice the length of the other, they would balance. No doubt, he said, that philosopher never tried that experiment at all, but if he had been told by some friend that it answered very admirably, the philosopher would have replied, "I thank you; I knew very well that such would be the case, although I admit I never troubled myself to try it." That was one class of philosophers: It was because their convictions were so strong that they never tried whether they were practically true. But there was another class, who delighted in trying the results of their deductions, and amused themselves with the most complex results, all of which they could account for most thoroughly. Perhaps it might not be too much for him to say that he considered himself as belonging to the latter class. He had always delighted in making experiments in mechanical science, and putting the results into a shape to be easily intelligible, for it was manifest that those who had gone through a mathematical education investigated by pure reasoning and trusted to it alone; but if we were able to prepare apparatus for illustrating striking results, then commenced the inquiry—"how do these things happen?" and then we looked at the reasoning by which such results were arrived at, inasmuch as all arose from a few simple natural phenomena. When we had acquired the true knowledge of weight, we proceeded by pure reasoning to the properties of the lever and the other mechanical powers, but we ought to exhibit the results in every possible variation, and then the scholar would listen with patience to the reasonings whence the deductions were drawn. The apparatus we had to construct, was divided into two classes. Persons who made original investigations into natural or physical phenomena, required apparatus of delicate construction, because these phenomena did not always admit of being reasoned out. With regard to friction, for example, we knew how many philosophers had experimented on the simple laws of friction. Mr. George Rennie had made some of the most admirable of these experiments, and he alluded to this circumstance with the greater pleasure, because we had the honour of being presided over on the present occasion by a distinguished member of the same family; but others had gone on, and they had found that the more accurate their experiments had been, the more true the laws had appeared. If, however, we constructed apparatus to try such experiments, we could only do so at vast expense; but if we wanted to teach the results, we selected the most striking cases that could be produced, and constructed suitable apparatus for the purpose of exhibiting those results to the classes under instruction. There were, however, a certain number of persons connected with the history of the mechanical sciences who had addressed themselves to the construction of apparatus for the purpose of teaching. He might mention the names of Desaguliers and Ferguson, who delivered lectures on this science in the beginning of the last century, and who published drawings illustrating the apparatus which they employed Desaguliers's lectures on mechanical phenomena were the first to render the subject fashionable. Then came Mr. Adams, a mathematical-instrument maker, who published some beautiful representations of apparatus for illustrating mechanical philosophy, constructed with great and perhaps unnecessary precision.

His (Professor Willis's) purpose was not to show anything new in the way of experiments, which were for the most part of the most kackneyed kind, but simply to explain his mode of constructing apparatus. Those obtained in general from the shop of the mathematical-instrument maker were so expensive and luxurious in their fittings, that it was next to impossible for an ordinary school to purchase a complete set of them. It could not be said to be the fault of the makers themselves, inasmuch as those who performed the experiments were willing to pay the price charged for the apparatus with which they experimented, and which apparatus was frequently required to be delicately constructed for the purposes of such experiments. If, for instance, you wanted to show that a 1lb. weight was balanced by a ½lb. weight by virtue of a larger leverage, you did not want an assay balance; a mere stick of wood was just as good an apparatus, for the purpose of popular illustration. What he wanted to be taught could be done with very ordinary apparatus. It was desirable to construct your apparatus with the utmost simplicity, with wood work, in order to reduce the expense, and it was also desirable that the lecturers should, as far as possible, construct their apparatus for themselves. This was what he wanted to encourage. He should hold it to be one qualification for a schoolmaster that he should be able to use tools. He thought a person could scarcely be fully competent to teach the mechanical sciences in our schools, unless he was able to make the greater part of the apparatus which he required for that purpose. The true art was to distinguish the parts which required delicacy and care from those which might be made of deal. The delicate parts must be paid for, and the rest might be made of wood, iron, wire, or whatever came to hand. When he wished to construct any apparatus, he made a drawing of it first. He gave one piece to a first-rate mathematical instrument maker, to construct, without regard to expense, and he then set his carpenter or his blacksmith, in Cambridge, to make the rough parts, without telling either of them the purpose for which they were intended. The final adjustment of the parts he took upon himself. The finer parts of the apparatus, of course, constituted the larger portion of the expense. Such was the course he recommended.

He would proceed now to the more direct business of the evening, which was to explain his mode of teaching statics by the mechanical powers, as the one most in vogue in this country. The more refined method was to commence with the action of forces, but that was not the best for teaching in country schools. If you wished successfully to teach the mechanical sciences, you must begin with the things that were ordinarily made use of. He had frequently asked for the fire-irons in the lecture-room, by which to illustrate the action of mechanical forces, and in his lecture-room in London he had got a cuckoo-clock, which could be taken to pieces, and other like toys; all these things excited an interest in persons new to the subject. You first opened a man's eyes; he saw that philosophers were not such abstract creatures, after all, if we would only lend ourselves to the objects around us. He taught himself mechanism by taking clocks, locks, and the like, to pieces, in very boyhood, and many another man had done the same. If we thus taught ourselves by means of common things, why should we not teach others by the same means in our lecture-rooms?

One of the first things required for apparatus was a set of weights. The accuracy of ordinary shop weights was sufficient for the purpose; only it must be remembered that shop-weights were adjusted a little higher than the true weight, because, from use on the counter, they in time wore down, and became less than the true weight, therefore you required them to be adjusted to the true weight, and then nothing could be more convenient for the purpose. The best way of suspending the weights was by means of a short transverse wire, with an eye in the middle, in place of the usual hooks. Two sets of cheap weights must be provided, beginning with eight ounces, and extending downwards to a quarter of an ounce. The next principal implement was a pulley post. This was a very simple piece of machinery—the pulley was the main point. In showing experiments on statics, forces were represented by weights at the end of a string, and to make these forces act in various directions upon the apparatus, the string was passed over a pulley. This pulley was provided with a clamp, by which it could be fixed to any part of a wooden post which was screwed to a heavy iron foot. Every piece of apparatus should perform as many functions as possible, taking care that it did not become a Jack-of-all-trades, and do everything badly. The professor here exhibited a cheap pulley, and contrasted it with a handsome brass pulley with a clamp, made with the delicacy fit for an assay-balance, the one costing as many halfpence as the other cost shillings. It consisted of a slip of thin bar iron, bent round to the necessary shape, with a piece of wire driven through a wooden pulley, and he showed that it turned even better than the more costly production.

The professor having described, from specimens before him, the ordinary mode of constructing the clamp of the pulley, proceeded to point out (also from specimens) the improvements he had introduced into this portion of his apparatus, observing that at the close of the lecture he should be happy to give further explanations to such as desired it. He then observed that all lecturing apparatus ought to be made on the largest possible scale; but the obstacle with such a collection was the consequent necessity of a large place to stow it away. It was, therefore, advisable to make each portion of apparatus serve as many purposes as possible. It was needless to mention the many failures he had experienced in endeavouring to make parts of his apparatus of universal application: their name was Legion. A tripod stand, or foot, exhibited, was mentioned as one that had proved eminently useful. Such a foot served as a general foundation for nearly every piece of apparatus that was placed on the table. It was necessary to have two or three of these cast iron stands on which any portion of the apparatus could be readily attached, and in attaching them he employed the common 3-8th square coach bolts, with fly-nuts. The first mechanical power exhibited was the lever. The action of forces upon one point should come before the lever, but that depended upon the method of teaching. Every one would teach statics according to his own text-book. Two pulley posts, at the proper distance from each other, and a string, in the middle of which was tied another string, the whole provided with hooks at the end, would show three powers in equilibrium on a point, and by applying the ordinary parallelogram of Dr. Lardner the proposition might be verified.

The lever exhibited was a long plain bar of wood, with holes drilled in it, and the bar itself carefully balanced; because, in statical experiments, the bodies acted upon were supposed to have no weight; and to represent that hypothesis we could only have recourse to balancing the bodies. The frame of the lever was constructed so as to prevent the lever from twisting, and there were two pins, on which the lever rested while the weights were placed upon it. This apparatus was adapted to show readily the properties of levers of the different orders, the laws of parallel forces, compound levers, and the various other statical propositions, most of which the professor exhibited.

The next mechanical power in order mentioned, was the wheel and axle. For the construction of apparatus of this kind, the professor employed pasteboard. The wheel and axle exhibited was formed of a large disc of pasteboard, and was adapted for a great variety of uses. Pins were provided as stops, to prevent it from revolving too far whilst the weights were being suspended. In the disc holes were bored, enabling weights to be attached, so as to demonstrate the proposition that forces acting obliquely upon a lever, or upon any solid body, were in equilibrium when in the inverse proportion of the perpendicular upon their directions. It also enabled the teacher to demonstrate the problems of stable and unstable equilibrium, oblique and parallel forces, the parallelogram of forces, the principles of the balance, forces applied in different planes perpendicular to the axis, and the general difference between wrapping and link contact in different planes. The professor then gave various illustrations of the mode of using the apparatus, stating, at the same time, that many portions of statics could be readily shown by it.

The professor next exhibited apparatus for demonstrating the principles of the inclined plane. None hitherto made had ever enabled him to perform all the experiments required in the present state of science. The professor described the construction he adopted—namely, an inclined plane—not hinged at the bottom, as usual, but at the top, with a sliding base, enabling it to be formed into an inclined plane of any proportion desired, the three sides being graduated, two being variable, whilst the third was constant, forming the unit of comparison. This, in conjunction with the pulleys and the pulley-posts, the professor showed, would enable a teacher readily to demonstrate all the principles involved in the inclined plane, including the pressure on the plane.

The screw and the wedge were next adverted to, the professor stating that it was idle to attempt to get rid of friction in making apparatus for exhibiting these powers. To do so would be absurd. The action of the wedge depended entirely upon friction. Without friction it would not act at all. He had, therefore, made his apparatus solely with a view to exhibit a solid diagram of the screw, so as to enable a teacher to show his class that the screw was nothing but a circular inclined plane, and also combined with a lever the power of the screw was produced. It consisted of a tin cylinder, divided into two parts by a spiral cut, the upper painted white, the lower black.

Thus the teacher was enabled to show to persons who were not familiar with solid geometry how the screw proceeded from the inclined plane, as well as another peculiar property of the screw, which had a great interest to a certain class of workmen; the peculiarity being, that the surface forming the thread of a screw consisted of an inclined plane of increasing inclination the deeper the thread was cut. This was shown in the apparatus by a circular inclined plane placed within the other. From this it was at once apparent that the inside portion of the screw must be formed of an inclined plane of increased inclination, inasmuch as the same perpendicular height had to be attained in a shorter space.

The whole secret of the construction of the model was that it consisted of tin plate. If made with tolerable care it was a very useful instrument for teaching. The wedge, the professor stated, he had constructed still rougher, because the theory of the wedge depended so much upon friction. It consisted of a fixed arm and a moveable arm, attached by a hinge, each having a roller. The wedge was suspended between them, and was loaded with a given weight; the moveable arm was also attached to a string passing over a pulley, with a weight suspended at the other extremity. The professor next proceeded to pullies, and described various arrangements for facilitating the manipulation. In order to manage the pulleys well at all, the weight of the pulleys should be taken into account. He had, therefore, so adjusted his as to bring the suspended blocks to the nearest number of ounces that would divide by the power of the combination.

The professor then pointed out to the notice of the meeting a simple means of explaining the nature of reactionary forces and their connection with structures. The apparatus for this purpose consisted simply of three legs, meeting together at a point, similar to the three sticks by which gipsies suspend their kettles. By the addition of as many strings, it could be put readily into the different forms of the shears and the derrick employed by engineers, and the different action of the forces in each case readily explained.

The professor next explained a system of pasteboards, which he had found very useful in enabling persons to set off and calculate, by descriptive geometry, the strains, and to demonstrate the directions they take.

By means of three sheets of pasteboard, cut in such a manner as to allow of their intersecting each other, with coloured lines so drawn as to represent the various forces, and the manner of resolving them, a class could readily be made to understand problems involving geometry of three dimensions. By this simple means the action of the three legs, the shears, and the derrick could be readily demonstrated, and the actual forces calculated by geometric measurement. Other applications of this system of pasteboards were shown, such as the distribution of weights supported on a three-legged table, the mode of obtaining the direction of bands connecting two pulleys not in the same plane, &c. Time did not admit of the professor showing other models which were placed on the table.

Professor Willis then proceeded to explain his new arrangement of Attwood's machine, and concluded by saying that the whole of the models would, in a short time, be exhibited in the galleries of the Museum of Economic Geology, in Jermyn-street, for the use of any persons interested in examining or copying them.

The professor hoped that his efforts in this direction would tend to reduce the unnecessary luxury of construction, and consequent high price, of philosophical apparatus, and that gentlemen connected with lecturing might be induced to follow his example in themselves constructing their own apparatus.

The Chairman proposed that a vote of thanks be given to Professor Willis, for the very able and lucid explanation which he had given upon this most interesting subject. At that late period of the evening he did not know whether any gentleman wished to make any observation. If so, he should be most happy to hear it. But he thought that Professor Willis had put forward this subject in so clear a light that it was almost impossible to add anything. He considered that it was one of the most important subjects that could possibly be brought forward, and it had fallen into the hands of one of the most able men of the present day to deal with it. The subject of simplifying the apparatus by which all mathematical and practical science was taught, and ought to be taught, was so important that he was very glad to find that such a man as Professor Willis had devoted his time and attention to it, and he had conferred a great public benefit by the very clear and simple manner in which he had described it. Everybody must be aware that the expence and difficulty of procuring models to illustrate the first elements of mechanics had been very great, and although the facts that they taught were very simple, yet it required a great deal of study to bring one's mind to bear upon them before we could thoroughly comprehend them. He thought that by what Professor Willis had done he was entitled to the thanks not only of the Society, but of the public and the nation. This apparatus, although apparently very simple, had been a work of very great thought, and as the Professor had very kindly taken an unusual degree of pains to illustrate it, perhaps he would still grant the further favour of allowing these models to remain at the Society for a day or two, so that members might have an opportunity of examining them. He was sure that the more they were investigated the more they would be found worthy of their attention, and that we were greatly indebted to the Professor for his very great kindness in explaining them.

The vote of thanks was then unanimously passed to Professor Willis, who briefly replied, when

The Secretary stated that the paper to be read on the evening of Wednesday next, the 9th of April, was "On the Manufacture of Articles from Steel," by Mr. J. Wilson. On this evening T. Dunn, Esq., will preside.

ECONOMIC MUSEUMS FOR THE WORKING CLASSES.

In the *Sydney Empire* for Tuesday, November 27, 1855, is a letter, signed "Joseph Dyer, Secretary, School of Arts," in which it is stated that the Governor-General had recently caused to be printed and circulated Mr. Twining's original Memorandum, entitled "Special Museums for the Working Classes." After giving a summary of this pamphlet, Mr. Dyer proceeds to consider the manner in which such a museum would be advantageous in that colony. He says:—

"First in order, I will suppose we had a museum illustrating the best construction of houses of all descriptions, with models that would enable a workman to apply the information conveyed. Let us take the present mode of constructing a slab-house in the rural districts of this colony. Is it done in the best manner? The timbers, I believe, are generally placed perpendicularly. Now, in America, where they have at least 100 years more experience than we have in the construction of log huts, the timbers are placed horizontally. A model of log huts from various parts of America would be very important. Again, the timber huts of the Swiss mountaineers might furnish us with most valuable hints. Those wide projecting eaves and exterior staircases are not only picturesque, but convenient. In this climate I can fancy they would be delightful At all events it is but reasonable to suppose that both in Switzerland, in America, and in many other countries by the experience of years and the continual adoption of such improvements in construction as suggest themselves to inventive minds, the art of constructing timber houses is much better understood than with us. Let us obtain models from thence, then, by all means, and abolish those unsightly tenements that deform so greatly the aspect of our country districts, and afford our rural population unhealthy, insecure, and even indecent household accommodation."

Again he says:—

"In the construction also of small town residences. Although in this city I am delighted to observe so many instances of that honourable 'pride to rear an independant shed' which has caused the stone-built suburb of Woolloomooloo to rise so rapidly into existence, I yet think that if the thrifty freeholders of these noble monuments of industry and perseverance had had access to the best designs for such structures, and could refer to models of all the recent improvements that have been made, a great amount of labour might have been saved to them and an infinitely better general effect have been obtained. It is well known that the ingenuity of hundreds of architects at home has been exerted for years past in the design and structure of small tenements. Now I do not think that the result of their labours is obtainable in a tangible form anywhere in this city. Only fancy, sir, what an advantage it would be to a man preparing to build a house, to be able to go into a museum where he might see models of foundations, of wall work, of timber work, of flooring, of hollow bricks, of stoves and grates, of iron pillars and girders, of flues and staircases, &c., of easily constructed doors and shutters and economical fastenings, or where he could see a pattern-card of cottages, all designed on principles combining health, economy, and convenience."

He then proceeds to suggest several other particulars, leaving it to each reader's own ingenuity to apply a measure to the advantage that would be gained by all classes. He thus observes:—

"We want to know how to wash sheep rapidly, safely, and well with very little labour. We employ at present, I believe, the rudest possible method for the purpose. I think it would be very easy to suggest some improvement in this useful colonial art. We do not know, I suppose, how it is done in all other countries. Models would teach us. I should be happy to exhibit a model for the application of machinery to this purpose.

"*The packing of wool in bales.*—I think the cotton bales of America are, as a rule, much better packed than our wool bales. Perhaps they are not, and I am mistaken; but I have no doubt whatever that such an extremely inventive nation as the Americans have machines, of easy application and great power, by which they compress their cotton into a small compass; at all events, it would do us no harm to see what methods they employ for this purpose. Models would teach us.

"*Mining for gold.*—It will not be denied, I suppose, that the Americans have gone a-head of us here in the application of machinery. If a museum had been established in this city at the outset of the gold discovery, with models of cradles, washers, long toms, troughs for conveying water to a distance, and all the various inventions which we have now acquired by a long and painful experience, how much labour, and how many thousands of pounds would have been saved. All these things models might have taught us."

Further on he says:—

"Do we, for instance, understand the storing and refrigerating of water like the Arabs who have made it their study for ages; or the Mexicans? Have we the best method and the handiest apparatus for grinding our wheat and baking our bread in our country districts? Can we learn no lessons in curing and preserving meat from the hunter of the prairie? Are there no methods of finding water in sterile places that inhabitants of a dry country could teach us? Could the South American tell how to break in and train our herds of wild horses? Could not India gives us some valuable hints in the construction of vast reservoirs and tanks against times of drought? Could not Canada tell us how to produce immense quantities of potash from our burning forests? Has the hardy American backwoodsman any means of clearing his interminable forests that our settlers might copy with advantage? Have they no powerful root-extractors that clear their lands of the stumps that deform ours, and render ploughing almost an impossibility? Above all, do we know anything about their system of plank roads, corduroy roads, and cheap railroads, by which they have opened up so many thousand miles of country? Surely these object are most desirable, and many more might be named, but I hope I have done sufficient to attract public attention to the scheme, which, if it is set on foot at all, should be made self supporting, although in the first instance it would be a proper subject for a liberal government grant to set it on foot."

AMENDMENT OF THE PATENT LAWS.

A public meeting was recently held in the Town-hall, Manchester, to petition parliament, and memorialise the patent-law commissioners, to allow the large surplus fund which has accumulated under the Patent-law Amendment Act of 1852, to be appropriated to a further reduction of the stamp duties now paid for obtaining letters patent for inventions. Wm. Fairbairn, Esq., F.R.S., presided.

The Chairman said, the meeting had been convened for the purpose of considering a series of resolutions in relation to the patent laws. Prior to the amendment of those laws in 1852, the cost of obtaining a patent was from £300 to £500 for the three kingdoms; the cost was now £175. The first cost was £5; the second, in six months, £20; the third, in three years, £50; and in seven years, £100. The number of patents taken out under the new act had so greatly increased that there was a surplus over the expenses of the patent office. This surplus had accumulated, in 1854, to £65,000, and in 1855, to from £90,000 to £100,000. What was to be done with this surplus? It was desirable to prevent such a large sum from going into the hands of the Chancellor of the Exchequer, and he (Mr. Fairbairn) thought that something should be done with it whereby a reduction would take place in the cost of obtaining patents; the cost ought not to be more than £80, or what was just necessary to carry on the machinery of the patent laws.

The following resolutions were carried:—

Moved by Mr. M. Curtis, seconded by Mr. Weild:—

"That as improvements in the arts and manufactures, and in mechanical and chemical science, have greatly conduced to extend the commercial greatness and power of the British dominions, every encouragement should be given to inventors consistent with the public welfare."

Moved by Mr. Richard Roberts, and seconded by Mr. Cresswell:—

"That in obtaining protection by royal letters patent, inventors should not be subjected to more expense than is sufficient to defray the entire cost of an efficient office and staff, and that it is unjust to tax them for their ingenuity."

Moved by Mr. Thos. Hopkins, and seconded by Mr. Johnson:—

"That a large surplus fund having accumulated from the stamp duties paid for obtaining letters patent, under the Patent Law Amendment Act of 1852, the government would be encouraging the ingenuity of our countrymen by foregoing the right to appropriate the said surplus fund to the national treasury."

Moved by Mr. W. A. Fairbairn, and seconded by Mr. Forsyth:—

"That it is the opinion of this meeting that the present stamp duties for obtaining letters patent for inventions might be reduced to one-half the amount at each stage or period of payment, and that there would still be a large surplus fund after paying all the expenses of offices, printing, supplying public libraries with copies of specifications, indexes, &c. It is therefore desirable to place the said surplus fund as a reserve at the disposal of the commissioners, for the purpose of complying with the spirit of the act of 1852, and for enabling them to reduce the fees or stamp duties from time to time, in proportion to the accumulation of the said fund."

Moved by Mr. Haley, and seconded by Mr. Sharrocks:—

"That the commissioners should be skilled in mechanical and chemical science, and devote the whole of their time to the Patent Office, and be paid by fixed salaries instead of fees."

Moved by Mr. Henry Fletcher, and seconded by Mr. Bell:—

"That a petition based upon the resolutions now passed be presented to the House of Lords, by Lord Brougham, and to the House of Commons by the Right Hon. T. M. Gibson, and that the Right Hon. T. M. Baines be requested to support its prayer; and that a memorial from this meeting, signed by the chairman, be presented to the Commissioners of Patents, soliciting their support and co-operation to obtain the consent of the government to allow them to carry the views of this meeting into practical operation."

The proceedings closed with a vote of thanks to the chairman.

Home Correspondence.

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ON TEACHING MECHANICS IN SCHOOLS.*

Sir,—Having been engaged during the past seven years as a teacher of chemistry and natural philosophy, I have taken the liberty of offering a few remarks on the subject of Professor Willis's paper. On the industrial importance of introducing elementary mechanics as a branch of national education, and the possibility (where the disposition and ability exist) of doing so, my mind has long been made up, and every day's experience only strengthens my conviction of the usefulness and suitability of such subjects for elementary schools. Wherever simple multiplication and division are taught, elementary mechanics may be commenced, and as the boys advance in arithmetic, so may they advance in mechanics. I have always regarded arithmetic as the most important subject in a school; boys who are good at figures are generally good at other things; but arithmetic, to be really valuable, must be taught as a science, not as a mere exercise of memory in rules, but as a discipline of the mind. It is because arithmetic has not been so taught, that the reasoning power of working men is generally very defective. Nearly all useful and practical questions in mechanics may be solved by a boy who understands proportion, but when levers are substituted for hogsheads of sugar and yards of calico, good-natured committees rise up and say, you are giving these boys a much better education than we had, and is it likely that a boy who can solve a question in the steam-engine, will ever think of getting a livelihood by hard work. The class who hold such opinions is still numerous, but every year diminishes their number, and it is only occasionally they have the moral courage to give expresion to such opinions. Elementary science is not much taught, and I fear some time must pass away before we can reasonably hope for much advance.

In the old endowed grammar and middle schools Latin and Greek are still studied, to the exclusion of almost every subject likely to be of practical benefit, and when these poor boys get into the world, they find out that the ordinary education of a national school would, in many instances, have been preferable to what they have received. I do not think I am overstating the matter when I say that there is not one of the old endowed schools of London where the least encouragement is given to the teaching of those common things which all boys ought to know and understand; many of the schools are pretty much the same as they were 160 years ago. The man who sends his boys to such a school in the present day does them an injustice. I am not speaking disparagingly of the study of Latin and Greek, the question is not so much whether these subjects shall be studied, but whether it is not desirable to introduce a knowledge of those things which bear more immediately on the practical business of life. It will probably be said that I take a very utilitarian view of education; I admit it, and when we have to deal with those who have to live by their labour it is the only useful view we can take. To those who have the time, ability, and means, a more rigid and exact course of study is no doubt desirable, and I should be very sorry to see the country deprived of the valuable services of abstract thinkers.

In national and British schools all the ordinary subjects of education are taught, and in many of them well taught. The only drawback is the early age at which the boys leave school. Nothing worthy of the name of elementary science is taught in these schools, except in the case of some of the Birkbeck schools, where it forms a systematic part of instruction. The education of the children of the working classes is gradually passing into younger and less experienced hands. Before the pupil-teacher system came into general operation, two or three good schools existed for the training of schoolmasters. The men who qualified themselves for the profession of a teacher were those who had distinguished themselves by great natural aptitude for teaching, either in a Sunday or evening school; many of them had served an apprenticeship to some mechanical occupation, such as carpenters, printers, smiths, shoemakers, and watchmakers; they were, in all cases, men who belonged to the class they had to educate. As soon as the Minutes of Council came into full operation the cause of education was deprived of the valuable services of any more of this class. Our training schools are now filled with sharp inexperienced boys and young men, clever in the solving of difficult equations, and in most cases able to pass a much more difficult examination than that required for many departments in the civil service. It was not to be expected from men whose early education had been very much neglected, who had spent some years of their life in the factory or the workshop, that in a written examination they stood any chance with the technical requirements of pupil teachers, but in professional skill and a thorough knowledge of the habits and wants of the working classes, they were infinitely superior, and more useful to the state than those we have now. I could point to the schools of these men scattered over the country which are very properly and justly regarded as model schools. At the time these men were trained, workshops were considered an essential element of training schools; models of steam-engines, water-wheels, mechanical apparatus, bridges, pumps, maps representing the physical peculiarities of the country, with looking-glass inlaid to represent the water, were manufactured by the students to illustrate the lessons given by the masters. As soon as they were appointed to a school, generally a month a two before they left the institution, their time was occupied in making apparatus. For years many of these men taught elementary mechanics and the principles of the steam engine with apparatus of their own manufacture. Except at Chester, I believe nothing of the kind is now done at any training school. The pupil teachers have for the most part a dislike to manual labour; they have very little mechanical ingenuity and power of manipulation; such attainments, if possessed, cannot be measured by a written examination, and nearly every thing in a training school is done to this end. If elementary science is to be taught, we must not only provide schoolmasters with suitable apparatus, but we must teach them how to use it, and this is especially true in reference to chemistry. I would not recommend much apparatus, and experiments which are doubtful should rarely be attempted in a school. What seems to me most wanted is apparatus which shall illustrate principles on as large a scale as possible. Things have been constructed for appearance more than use. Mathematical accuracy has been attempted when it was by no means necessary, and the price has often placed it beyond the reach of ordinary individuals. Any complex apparatus, likely to get out of repair, is quite unsuitable for schools. Good illustrations of the lever, the wheel and axle, vertical and horizontal pullies, the inclined plane, models of pumps, steam engines, cranes, and generally those machines in common use in the particular locality in which the school is situated. In schools and classes in Mechanics' Institutes you rarely find persons capable of that reasoning upon which the solution of a problem depends. The style of teaching, and the subjects taught, must be adapted to the minds intended to receive the instruction. Some things which may be a useful acquisition to one mind, may not be so to another. To those who are without any aptitude for mathematical investigations, you must supply by experiment what they cannot do by reasoning; and all the leading principles of mechanical science, can be so illustrated. The mathematical training of Cambridge frequently unfits men for that style of teaching and illustration which adapts itself to the capacity of working men. The trade schools which are springing up in different parts of the country, will, I trust, open up a new field for the more general cultivation of science, especially those sciences upon which the industrial arts depend. The influence of art teaching is now felt in every class of society. What has been done in art, will, I hope, be done for science. No subjects are so well adapted for general instruction as those which admit of experimental illustrations, it arrests the attention of the children, they look forward to the experiments, and if you impress on their mind what you intended by the experiment, it makes a deep and lasting impression.—I am, &c.,

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* The following letter, from Mr. Buckmaster, of the Wandsworth Trade School, was received some days prior to the delivery of Professor Willis's lecture on Wednesday last.—Sec.

J. C. BUCKMASTER.

Wandsworth Trade School, March 28, 1856.

PROFESSOR WILLIS'S LECTURE ON APPARATUS FOR TEACHING MECHANICS.

Sir,—I beg leave to offer a few remarks upon the highly interesting description of apparatus and models brought before the Society of Arts, this evening, by Professor Willis, who deserves the highest praise, from teachers of natural philosophy in particular, for the very great attention he has given to this department of educational aid. Without pretending to the experience and skill of the learned professor in this subject, I yet venture, as an humble individual, who has made some practical acquaintance with philosophical apparatus, to suggest that a somewhat simpler arrangement for showing the properties of the lever might be effected. In the instruction of persons of ordinary abilities, especially the young, by popular lectures, it is highly necessary that little or no complexity of arrangement should be presented *to the eye*. Now, I venture to assert that the adjustment for exhibiting the second and third kinds of levers, as proposed by Professor Willis, is one likely to confuse the tyro by the substitution, in place of the usual pulley, of an arm, or second lever, giving to the apparatus the appearance of a compound arrangement. I have, for some time past, used a lever of cheap and simple construction, turning on an axis, and convertible at pleasure, by the intervention of a pulley, to any of the three descriptions of levers usually spoken of. Again, the exhibition of the pressure on the fulcrum, and the more complete case of the relations of parallel forces, may be exhibited by the simple arrangement of a rectangle of wood or other light substance, placed so as to float on the surface of water in a tray; strings are fastened to proper points in the upper surface of this float, and arranged over pulleys, by means of weights. This experiment used to be successfully shown in the class-room of University College. But the main defect in the apparatus exhibited by Professor Willis appears to me to be the want of a surface of a description suitable for drawing upon, immediately at the back of such experiments as are designed to illustrate the laws in relation to the composition and resolution of forces. For this purpose I find most useful a circular black board, about three or four feet in diameter, standing in a vertical plane; to the centre of this I can attach a smaller circle, moveable about an axis through its middle, which may be acted upon by weights attached, over pulleys, to certain points, so as to illustrate the theory of moments, or the general case of the lever and the wheel and axle; or, removing the smaller circle, I can exhibit varieties of the composition and resolution of forces in the same plane; the black board enabling me, by the aid of scale and compasses, to show geometrically the relation of the weights to the sides of the quadrilateral. With respect to weights, I would suggest that cylinders, formed of brass tubing, of different diameters, and filled with lead, would be found preferable to those exhibited; such a set I possess in my collection, and can answer for their cheapness and greater simplicity of appearance. Perhaps I may also be allowed to say that white cord is best adapted in all cases where the direction of the force is required to be exhibited in the lecture room, particularly for the pulleys. The remaining apparatus cannot, I think, receive any suggestions towards improvement such as I have ventured to offer, being most admirably adapted for the object Professor Willis has in view in its formation. The pulleys, inclined plane, screw, wedge, the clamps, stands, &c., are convincing proofs of the superior advantages obtainable by employing apparatus designed and manufactured by the skilful teacher himself. In the case of one of our London colleges, notwithstanding the possession of a most extensive collection of apparatus for natural philosophy, the manufacture of some of our best instrument makers, it was found needful frequently to have recourse to the carpenter and smith to supply the place of more costly, but perfectly useless arrangements.

I am, Sir, yours, &c.,

FREDERIC JAMES MINASI.

Islington, April 2, 1856.

EDUCATION OF THE ARTISAN, AND EMPLOYMENT OF WOMEN.

Leeds, March 31st, 1856.

Sir,—The members of our Mechanics' Institution and Literary Society were much interested, on Wednesday sen'night, by a lecture from Mr. John Bennett, of London, on "A Watch; what to make, and how to make it." The explanations are so lucid, graphic, and vivaciously given, that the audience could not fail to obtain a pretty correct idea of of the construction of that invaluable pocket mentor

—a good watch. But the portion of the lecture which excited the deepest and liveliest interest was that in which Mr. Bennett described the economy of the manufacture as carried on in the Swiss Cantons, on so large a scale, and at so low a cost, as to threaten the extinction of this department of our productive industry, at any rate so far as all but the very best and most expensive articles are concerned. In confirmation of this view it was stated, that last year Neufchatel alone made a million and half of watches, while Great Britain only produced 180,000. Mr. Bennett ascribed this result to the joint operation of several causes;—first, to the education of the people; second, the minute subdivision of labour; third, to the very extensive employment of women, who exhibit a delicacy of manipulation peculiarly suited to the almost microscopic work connected with the fitting up of a watch.

Now, important as this is, as regards the particular article adduced, to exemplify the utility and profit of a philosophically practical application of means to ends, it forcibly suggests the consideration of the same questions in relation to many branches of our manufactures. The advantage of division of labour is a "great fact" in manufacturing industry so universally acknowledged that I need not advert to it. But, though there is a vague acquiescence in the doctrine, that a well instructed is, upon the whole, better than an ignorant, population, the practical relation of the education of the worker to his work is neither clearly recognised by the operative nor the employer. The *practical mind* of England is impatient of such subtle considerations as these, and as it often discovers that the most dexterous hand is the least book-learned, it inclines to the notion that a good craftsman is illiterate, as a matter of course, and it is now very much perplexed with the dogma, that the well-instructed mechanic—all other conditions being equal, is immeasurably superior to his unlettered shopmate. May I insinuate further, that the idea of "Jack being as good as his master," is not quite naturalised in the practical mind? Now, although there exists abundance of evidence on this subject, I am not aware of its having been collected and put forth in a popular form, or with the distinct and emphatic sanction of men so far representing the manufacturing industry of our country as to be regarded as acknowledged authorities. Mr. Charles Knight's excellent tract, on the results of machinery, since re-issued with several on collateral topics, under the title "Knowledge is Power," embraces many of the arguments on this subject; and in Mr. Fairbairn's recent work, the education of the mechanic is, I am happy to find, strongly insisted on. In Dr. Lyon Playfair's papers on cognate subjects, the utility of scientific instruction to our working population is admirably enforced and exemplified by the real studies of the German and French schools. But no large section of either employers or operatives is likely to see these or similar works; moreover, the active, enterprising, and, upon the whole, intelligent class of masters—of all grades—are not as yet educated men. The prudence which has helped them to escape the casualties of trade, has also taught them to be very shy of any theories or schemes not confirmed by such experience as they possess or can appreciate. Besides, the so-called "scholars," who occasionally attract their notice, and not unfrequently excite their contempt, commonly acquire the title on the strength of some mere facility with the pen and tongue, of questionable utility, and of which "Practical mind" is apt to say, "Let that appear when there is no need of such vanity," especially when unaccompanied by corresponding handicraft aptitude. The clear exposition of the kinds of knowledge which it is desirable the operative classes should possess, the specific benefit to be expected from its diffusion, the loss of time, material, and effectiveness experienced in every shop and factory from the deficiency of such knowledge, these are subjects which I venture to submit should be laid before a large body of the trading and manufacturing classes, and I know of no place so suitable for the purpose as the Hall of the Society of Arts. The paper on the subject should be given by some gentleman well known, not only as an employer of labour, but intimately acquainted with the workers and their work, so that the charge of speculation and theorising, in place of reasoning from facts, would be quite untenable. Every means should be taken to secure a good assembly of the representatives of every description of manual industry; and I am persuaded that the paper and discussion sent broad-cast over the land, would give a smart impulse to the sluggish indifference still existing on this all-important and most practical question.

The other topic suggested by Mr. Bennett's lecture is one which I feel to be of vital national importance—the extended employment of women in many of those manipulations hitherto exclusively performed by men. Of the million and half of watches fabricated last year at Neufchatel, it is a simple fact that a very large share of the work was entrusted to female hands. Mr. Bennett asks, why cannot we employ the active fingers of our young women in the same way? The question is a very natural and rational one, and its answer might, I conceive, take the Hibernian form of reply, and further enquire, why we should be precluded from employing women in any occupation in which they are qualified to excel? I have no statistics at hand to refer to, but I believe I shall not be far wide of the mark in asserting that, except in teaching and producing a few of the ingenious fabrics of the needle, no large body of women is engaged in any handicraft operation calculated to bring into exercise an appreciable amount of skill or intelligence.

I am aware of the efforts which have been made to turn female talent to account in the arts of design, engraving, &c., and I heartily wish them success, but as yet we can only congratulate ourselves on an auspicious beginning in these departments. Education, as regards men, has, to a very limited extent, diverted labour from its usual channels. The tradesman's son is apprenticed to a business as of old, and, except he be a great booby, he works hard, and feels a pride in his labour. Not so with the daughters of middle-class England. It it needless to enumerate the employments they were wont to consider reputable; it is sufficient for our purpose to remark, that the only source of livelihood now deemed respectable by the females of this class of society is that of a governess or teacher, and thousands are, in common parlance, highly educated, to qualify them for this avocation, either directly or as a contingent means of support. The result may be read at large in the advertisements for situations by ladies anxious to teach several languages, with music, and an English education, and who only ask food and shelter, delicately paraphrased "the comforts of a home," as an equivalent for their services. Failing this, they sadly swell the squalid ranks of the distressed needle-women of our great towns; at domestic service or other drudgery they cannot work; to beg they are ashamed. This is no fancy picture; it records a melancholy state of things, of which I have personally known many instances. But the mistaken pride to which the very narrow acceptation of the term "genteel employment" is attributable is yielding to the pressure of necessity, and the good sense of the parties vitally interested in the question; and, I have no doubt, that the offer of occupations in which women of good education, and accustomed to the comforts and proprieties of good society, could engage without loss of self-respect or offensive association, would be eagerly sought by thousands of most intelligent and respectable young women; especially in manufactures requiring the exercise of taste, would the qualifications of well-educated women prove valuable, as the absence of all cultivated refinement among the humbler classes unfits them for such avocations.

The "distressed seamstresses" question, too, is hastening to a solution through the instrumentality of sewing-machines, which execute with the greatest facility the work most trying to the eyes and least remunerative—the finest stitching, and must soon supersede a very large portion of needlework, whether performed by men or women. In every department of our textile fabrics, from spinning the yarns to weaving the most complicated patterns, women are employed, not in toilsome drudgery, but in watching the operations of the machinery, correcting, adjusting, and vigilantly preventing the defects and irregularities which varieties in the integral structure of materials occasion with the most perfect mechanical appliances. And no one doubts for one moment that a woman does all this better, and even more easily, than a man could.

This subject would, I also think, afford an excellent one for consideration by the Society, especially if treated by some gentleman, or, still better, by a lady, who would be at the pains to collect the statistics of female labour in this country, and also in France, Switzerland, Germany, and the United States. The French ladies undertake a host of duties which we never entrust to any but the "lords of the creation," and we may possibly profit by their example without slavishly following it. The United States has demonstrated that factory labour may be associated with—as it indeed offers many facilities for—the exercise of literary tastes and intellectual pursuits; and the "merry Swiss maids," according to Mr. Bennett, have well-instructed minds to direct the fairy fingers they employ so deftly in watchmaking.

This letter has extended beyond the limits I designed, and I will, therefore, only add that I hope the subjects broached in it may shortly be properly discussed by the Society.

Yours truly,
W. H. J. TRAICE.

PATENT LAW REFORM.

7, Duke street, Adelphi, March 31, 1856.

Sir,—Allow me to "*placer mon petit mot*" in the important debate on Patent Law reform, so ably taken up in Mr. Bridges Adams's letter. Although both the *exposé* and the conclusion drawn show the clearness of apprehension of a practical man and the precision of a mathematician, yet, I cannot help thinking that an important item has been overlooked by that eminent critic. I mean to allude to what I should call "international rights of inventors."

The rights of inventors having often been compared, in full justice, to the common copyright, I do not see why they should not include the same advantages as the latter, which has already been effectually secured by international treaties between most of the civilised countries. In the circular of the Minister of Agriculture, Commerce, and Public Works, alluded to in the late discussion and in Mr. Adams's letter, the French minister complains of the possibility of unprincipled persons pirating French inventions, and patenting them in foreign markets. There certainly exists more than a possibility of such unfair proceedings, for if a patient compiler of all the valuable material on patent matters collected daily at the Great Seal Patent Office from abroad and at home were to compare the many specifications of a similar title which have been filed at about the same time in different countries, he certainly might discover many cases which would give rise to strong suspicions as to the veracity of one party, at least. Now, why should not such a nuisance—such an immorality—be abated at once by the introduction of a legal provision to that effect, in the patent legislation of all such states as would recognise the principle of international rights of inventors? Let England make the first move in that direction. Let her Government say to other Governments, —"We are ready, on conditions of reciprocity, to grant to your inventors the required priority for their inventions in our market, *i.e.*, we shall grant them the power of taking out patents in England as original inventors, from the official date of their foreign patents, provided they do so within a certain time, say three years." Such a measure, I should say, would at once cut short all attempts at carrying out piracy from one country to the other, since no lust of gain, however great, on the part of a pirate, could withstand the dread of the original inventor coming forward within three years; whilst, on the other hand, full scope would be given during that time to inventors, as well as to the public, for testing really good inventions, and for bringing them honestly in the market. To resume, I should wish to see the following fifteenth clause added to those put down by Mr. Bridges Adams:—

"All foreign inventors, from such states as have concluded international treaties on reciprocal terms, shall be entitled to letters patent in England, that shall bear the same date as those taken out in their respective countries, provided such applications are made by them or their assignees within three years from the date thereof."

Finally, allow me to call your attention to the subjoined extract from the *Scientific American* of the 15th ult., edited by Messrs. Munn and Co., at New York, and which enjoys a deserved popularity in the United States. That article is of a certain interest, since it shows how the present question of Patent Reform is looked at on the other side of the water.

I remain, Sir, your most obedient servant,
A. TOLHAUSEN,
Sworn Interpreter at the Imperial
Court of Paris.

Extract from the "Scientific American" of 15th March, 1856, (Vol. IX., No. 27).

"As the British Patent Fund is not exclusively the product of British contributions, we claim to have a voice in the disposal of it, and in the name of our inventors, who pay a considerable amount yearly to it, we ask for a reduction of British patent fees.

"The British patent fees have been greatly reduced from what they were previous to 1852, but they are still too high. They may be still further reduced one-half, and yet pay all the expenses of the Patent Office handsomely. We hope British inventors will begin and advocate this reform, and press it vigorously upon Parliament. The English Patent Laws were made for rich, not for poor inventors; and it is well-known that the great majority belong to the latter class. There is not one English journeyman in ten who is able to pay the large patent fees charged for protection. When an English journeyman mechanic invents a useful machine, he has to seek the patronage of a more wealthy person to enable him to secure his invention. He is, therefore, obliged to place himself in the power of another person, or lose the benefit of his invention. Such a system is too strongly feudal for the present age; and we call upon Sir Joseph Paxton, who was once a journeyman himself, to devote his energies, first, to the removal of this the greatest evil connected with the English patent system. We admire the efforts he has made to secure the surplus Patent Fund from the grasp of the Government—to save it from being used like the general revenue; but we believe the best and justest way of benefiting inventors is to reduce the patent fees.

"When the subject of 'Patents' was brought before the late meeting of the British Association, held in Glasgow, it was refreshing to inventors to hear the sentiments expressed by such distinguished men as Sir David Brewster, Fairbairn, and others, regarding the price charged to inventors in England for patents. The combined opinion of these savans was, that patents ought to be granted to inventors free. They considered that inventions conferred great public benefits upon the country, therefore, the public could well afford to grant patents to inventors without charging them for the privilege. We could also advocate the same policy, as a measure both wise and politic for our country; but as politicians would always be growling at the necessary appropriations for the Patent Office, our inventors, we know, would disdain to have it insinuated that they were the least burden upon the country. For this reason, therefore, we advocate moderate patent fees—the lowest possible to pay the necessary expenses of the Patent Office, and no more. And as Judge Mason has recommended a reduction of our patent fees to British subjects, we hope English inventors will also zealously advocate a reduction of theirs, for their own benefit and that of our inventors who may desire to secure patents in that country."

A LETTER ON YERVA DE PARAGUAY.

Sir,—Mr. W. Bridges Adams says, in his interesting "Chapter on Yerva de Paraguay," that I am wrong in calling the article used as tea in South America by the name of *Maté*, which he says is the Indian for calabash.

I will not pretend to contest the point with him as to the absolute meaning of the word, but I am quite prepared to prove that not only do several personal friends of my own, who are natives, and have been residents of Brazil, assert that the term is always, in that country, applied to the material used, namely, the twigs and leaves of the Paraguay holly (*Ilex Paraguayensis*), or Yerva de Paraguay, literally the Paraguay herb, or plant. Moreover, I have invariably seen it imported into Liverpool under the name of *Maté;* and in every work whose author has mentioned the habit, I find a similar application of the word—at least, I should say, in those works known to me. I have examined the Indian vocabularies, collected by Mr. Wallace, and arranged by Dr. Latham, but cannot find the word *Maté*. I am, however, fully aware of the extraordinary variation in the dialect of the South American Indians. I gave the article that name by which it is known in commerce, and also in our best botanical works, and unless your correspondent can show some more cogent reasons for changing the name, I must continue to adhere to that which is so well known and generally used.—Yours truly,

THOS. C. ARCHER.

Proceedings of Institutions.

Greenwich.—Two lectures, on Birds, were delivered at the Society for the Diffusion of Useful Knowledge, on Tuesday, March 11th, and March 18th, by Robert Thos. Hulme, Esq., F.L.S., M.R.C.S.E., Lecturer on Comparative Anatomy and Zoology at the School of Anatomy and Medicine, adjoining St. George's Hospital. The lecturer commenced by observing that, while man was not able to traverse his railways at a greater speed than 60 or 70 miles an hour, the eagle would accomplish as many as 140, and that the fishing eagle descended with such rapidity upon its prey, that the eye could scarcely follow it. The power of long-continued flight was exhibited by the migratory birds, many of our summer visitors coming from Central Africa. More extraordinary still was the occurrence in this country of the yellow-billed cuckoo and the purple martin, natives of America, and which must have passed over the whole width of the Atlantic Ocean. This power of flight was shown to be intimately associated with the hollow condition of the long bones of the bird. These cavities communicate with the lungs, and are filled with air, the temperature of the bird being double that of the atmosphere. This air becomes rarified, and the animal may be described as a living balloon. The structure of the feathers was explained, and shown to justify Paley's observation, that "every feather is a mechanical wonder," while the eider down had been proved to be the most perfect material for warm clothing of all animal and vegetable productions. The history of the birds of prey was then entered upon. There are birds remarkable for their powers of flight and of acute vision, feeding upon dead or living prey, and guarding man against the diseases that arise from decomposing animal matter. The habits and peculiar structure of the parrots, cuckoos, woodpeckers, and other land birds, were successively sketched out, and the lecturer concluded by observing that, apart from the benefit which the birds bestowed upon the human race in common with many other animals, there was a mental and a moral influence more peculiarly their own. It is the bird which especially gives life and animation to the landscape; their voices are heard heralding the summer, and giving promise of the fruits and grain that man is to gather up against the coming winter. Few persons can have listened to the song of the summer bird without experiencing a soothing, or even an elevated influence; that even when the snows of winter covered the ground the robin came to us, asking us to relieve his wants, reminding us of the wants of others, and teaching us charity and hospitality to our fellow-man. But for these creatures an almost unbroken silence would reign around, and it was not until they were summoned into existence that the melody of sound was added to the other charms of Creation.

Halifax.—On the 26th ult. a large and influential meeting was held at the Haley hill school-rooms to inaugurate the opening of a Working-man's College, for the instruction of adult workmen in the most useful branches of a literary and scientific education. The College is to be managed by a committee of working men. Edward Akroyd, Esq., took the chair, and was supported by Dr. Booth, Chairman of the Council of the Society of Arts, Mr. G. F. Foster, of Bradford, Mr. Hope Shaw, of Leeds, Mr. Gott, of Leeds, Mr. Wheatley, Mr. John Waterhouse, &c., who severally addressed the meeting.

Royston.—Two years ago the committee of the Mechanics' Institute appealed to the public to assist them in raising a fund for the purpose of erecting a lecture-hall, a museum, a library, and rooms for reading and class instruction. The first steps in the enterprise were taken in March, 1854, and now, in March, 1856, the project has been realised, and on Tuesday in last week, a meeting was held in the lecture hall, for the purpose of publicly inaugurating the new building. It consists of two floors—the museum, a spacious apartment, two reading-rooms, the library, and the rooms for class instruction, being upon the ground-floor; while the lecture-hall, which is 60 feet by 30 feet, and 20 feet high, occupies the whole of the upper story. The hall is lighted with a large sun burner, depending from the centre of the roof, and consisting of seven clusters of nine burners each. The cost of the erection of the building was £1,600, of which sum £1,000 has been already raised by donations, leaving a balance due of £600, which has been advanced by the trustees and the committee. The meeting of Tuesday was presided over by the Earl of Hardwicke, who, in his opening address, observed that the objects of Institutes such as that was to make science known to, and understood by, its members; and that it was by such means that the working classes could best advance their social interests. He then went on to say, that "the educated were distinguished from the uneducated classes by the moderation with which they reviewed the conduct and the opinions of others, and by their indisposition to condemn those who differed from them. And one of the effects of the diffusion of education among the poorer classes would be to lead them on all occasions to contend and argue with justice and moderation, and to become loveable and attached members of society. From the study of science they would learn the important and useful lesson—that man forms and creates nothing; but that science teaches him how to collect and combine from the works of the Creator whatever is useful to man." After the chairman had read a letter from Lord Dacre, expressing regret that he was unable to attend, the Rev. L. V. Harcourt said the subject on which it was his duty to offer a few remarks was, "The Institute; its educational importance to the adult, and to the young after quitting the school." He remarked that "it was a fact, which was pretty well established by the reports of the government inspectors, that very few children remained at school after the age of nine or ten years. And this observation led him to refer to a mistake which had been made by Mr. Horace Mann, and repeated by Sir John Pakington, Lord John Russell, and others who had spoken on the subject of education. The statement was that there are five millions of children between the ages of five and fifteen: and as only two millions are inscribed on the school books between those ages, the inference was that there were three millions of children uneducated. Now this was a transparent fallacy. It was admitted that the majority of children left school at nine or ten years of age, and therefore the numbers should be taken, not between the ages of five and fifteen, but between the ages of five and ten. And, as the number of children between those ages was two and a-half millions, and two millions were inscribed on the school books, it would follow that, instead of there being three millions of children uneducated, there was really only half a million uneducated."—The Hon. Eliot Yorke, M.P., next addressed the meeting on the following topic:—"The Museum: valuable in affording lessons from the past, and illustrations of the present condition of the world, and in preserving records for futurity." He remarked that "one of the old Roman poets had beautifully enforced the truth that the mind was much more readily awakened by that which presented itself to the sight, than by that which reached it through the intervention of the ear. When a man saw an object, it aroused his curiosity, and stimulated him to inquire. He therefore urgently appealed to them to give a voice to the now bare walls of their museum—to make them speak to the hundreds and thousands who might hereafter enter this building in a language peculiarly their own."—Mr. Puller then rose to speak to the following subject:—"The reading-room—an inestimable boon to the industrial classes, in providing well-conducted newspapers and wholesome periodical literature for their amusement and instruction." He said that this subject naturally divided itself into two parts—the one having reference to newspapers, and the other to scientific publications. As the advantage to be derived from a study of science had already been urged on the attention of the meeting, he confined his remarks principally to the benefits derivable from the newspaper. — The Rev. T. Robinson, D.D., said the subject which had been consigned to his advocacy was, "The education of all classes as a means of social and moral improvement." "In dealing with this question, it was necessary," he said, "to determine what was education. He would give a definition, which, as far as it went, he believed they would accept as a correct one. Education was, he considered, the development of the mind of man in all its powers, for good ends. Education was not a mere mechanical work, carried on and completed at the Grammar School, or at the University; but it was a constant development of the mind, a drawing forth of the intellectual powers of the man, leading him to think at every step, teaching him that he has feelings, and affections, and desires which link him with the human kind, and unless they are excited, directed, controlled, and trained into channels of usefulness, he himself is an isolated being—no good to himself or to his fellow-creatures. Education was to teach and enable a man to live to really good and useful ends, to have loftier aims and nobler objects than the gratification of his own appetite or the exaltation of himself among his fellows, to promote the good of mankind and the glory of God." Dr. Robinson concluded by calling attention to the proposal recently made by the Society of Arts to give certificates of proficiency to young men who may successfully pass examinations in different branches of study.—The Rev. W. W. Harvey then addressed himself to the next topic:—"The Library and its Use," and said that they might divide the contents of a well-formed library into three sections—Professional Works, Works of Imagination, and Works that treat of the History and Philosophy of Facts.—Votes of thanks to the chairman, and to the gentlemen who addressed the meeting having been unanimously passed, the meeting separated.—The committee intend, in the month of May, to open an exhibition of objects illustrative of science and art and their application to manufactures, natural history, archæology, &c. The committee have received many offers of aid, and they hope that the receipts on that occasion, as well as special donations to the same end, may enable them, ere long, to completely liquidate the debt of £600 still remaining on the building.

Southampton.—On Monday night a large number of the members and friends of the Polytechnic Institution, assembled at the Royal Victoria Assembly-rooms, for the purpose of considering the benefits and advantages derivable from Mechanics' Institutes.—Mr. J. R. Stebbing, the president of the Institution, took the chair, and called upon the secretary, Mr. Pond, to give the meeting an outline of the position and prospects of the Institution. It appeared that it had been 27 years in existence, during which time it had encountered many difficulties, notwithstanding which the Institution had been the means of greatly assisting the cause of education in Southampton. At present it was in debt; the many calls which had been made upon their funds, owing to the increase of members, had to some extent been the means of bringing about these difficulties. The present number of members is 380, and the expenses, it seems, are more than the proceeds can comfortably bear.—Dr. Booth was then introduced to the meeting by the chairman. He said: The stock subjects of discussion at meetings like the present have been so often handled, that one hardly knows what to say that has not been said, and said much better, a hundred times before. Who at the present day doubts the necessity of education, or the utility of instruction, or the dignity of knowledge, or the advancement of learning, or the progress of civilisation? Now, as I am not master of so much originality of thought as to be able to place such trite topics and threadbare subjects under a newer dress and more becoming attire, I had much better seek for freshness in the ground I occupy rather than in the mode of treating it. I will, therefore, without further preface, place before you what the Society of Arts in London is proposing to do for the advancement of education. Many of you are no doubt aware that nearly all the Mechanics' Institutions and Literary Societies of the country are in union with the Society of Arts. Now we propose to hold periodical examinations, conducted by men most of them of the very highest eminence in science, literature, and commercial knowledge. At these examinations it is intended to give prizes, appointments, when placed in our hands (as two have been annually by that constant and liberal friend of education, Mr. John Wood, Chairman of the Board of Excise), and certificates of merit to be awarded with the most scrupulous rigour and the strictest justice. We trust that these certificates so awarded will be accepted by the public as testimonials of competency and proficiency. To ascertain how far the public might be disposed to acknowledge the utility of such a scheme, and to place confidence in the Society as well, the Council drew up a form of declaration of confidence, and had it circulated to some extent throughout the country. Now, this declaration of approval of the plan proposed to be followed, and of confidence in its development under the control of the Society of Arts, has received a very large amount of public support. Very few public documents have ever exhibited a larger amount of influential independent public opinion than the one I hold in my hand. Fortified by the clearly expressed approbation of the manufacturing and commercial interests of the country, we shall proceed to develop our scheme of examination. But the Institutions must support the Society of Arts in working out this measure. They must aid us by holding preliminary local examinations, as the Leeds and Huddersfield Institutions, the Liverpool Collegiate Institution, and other important establishments are preparing to do, so that our examiners shall not be subjected to the trouble of examining, and the irksomeness of rejecting, candidates wholly unprepared to pass any examination. If the Mechanics' and other similar Institutions of the country are willing to support us, we shall be prepared to co-operate with them to the utmost of our power. It is only within the last few days that the privilege has been conceded by the Committee of the Privy Council of Education to the Society of Arts of supplying to the Institutions in union with it books, maps, and other educational apparatus at the reduction in price—a very great one indeed, some 50 per cent.—which is now allowed to national and other schools under inspection. This is a great boon to the adult population of the country. I only hope they may be induced to avail themselves of this most valuable privilege to the widest extent. But now some of you may ask what is the use of examination? An examination only tests the amount of knowledge a man has: it does not furnish him with it. It sounds the depth of water in the well, but it does not contribute the supply. Now, even granting this, it may be a matter of much importance to learn the exact depth and quality of the water in the well, whether it be clear and deep, or turbid and shallow. But at the present day men are pretty well agreed as to the value of examination. Success in competitive examination is now the sole passport to employment in the East India Company's service. It is also a necessary preliminary to admission into the Royal Artillery and the Royal Engineers; into the Admiralty, the War Department, into the Privy Council-office, and the government departments generally. Examination is now everywhere admitted to be a most valuable test of fitness, and a most efficient stimulus to education. But when, nine years ago, I reasoned out all those results which are now universally accepted as truths, and put them together in this pamphlet which I hold in my hand, "Examination the Province of the State," my views were looked upon as visionary and Utopian. You will find here all the arguments, or nearly all those which are now so triumphantly used to show how examination is not only the best test of proficiency, but the most effectual stimulus to acquire that proficiency. I cannot but think that a general system of national examination, to be gone through by every person before admission to employment, would do more to promote education—I mean voluntary education, or self-instruction—than any mere increase of our schoolhouses or schoolmasters, or any amount of local rating. Few men, indeed, at the present day, remain ignorant through sheer inability to obtain the necessary books or the requisite instruction. They wallow in the mire of ignorance, indolence, or sensual indulgence, because they have no tangible inducement to exert themselves to rise out of it. Make education a thing actually equivalent to pounds, shillings, and pence—an article of money value—and then she need no longer cry aloud in the streets—the multitude will seek and obtain her, however difficult to find. Why should not the youth intended for commercial or manufacturing pursuits have the same or equivalent inducements held out to him to labour as the son of the nobleman who proceeds to college? That it is not so much the want of education as the want of inducement that is felt, may, I think, be clearly shown from the reports of her Majesty's Inspectors of Schools, who, with singular unanimity, complain of the early abstraction of boys from school. The parents are induced to take them away by the hope of the most trifling pecuniary advantage. Supply one something greater on the other side, throw a small preponderating weight into the other scale—the hope of worldly advancement—and we shall no longer have to complain that the education of our middle and lower classes is nipped in the bud by domestic necessities or parental selfishness.—The Hon. and Rev. S. G. Osborne congratulated Dr. Booth upon having lived to see what he had so much desired—a plan in operation for throwing open to unaided merit situations not only under the government, but in many other positions equally honourable and lucrative, requiring sound education and high principles. He congratulated them that such was the case, as there was now an opening for every young man, who chose to put forth the talents with which God had blessed him, to carve out a path through life for himself. He had lived a great portion of his life amongst mechanics, and he had thereby learned to have an interest in them, and to know the difficulties which beset their path, and to know that there was no class of men to which he would sooner open fields of intellectual knowledge than those who moved the hand by the training of the head.—Sir A. Cockburn, M.P., then rose and said, the chairman had adverted to the difficulties under which Institutions of the kind laboured, owing to the state of the law in reference to their rating and taxation. All he could say was, that he would give his most anxious attention to the subject, and would do all he could to effect such modifications of the law as would remove the difficulties under which Institutions of the kind laboured.—The Hon. Judge Norton next addressed the meeting, testifying to the advantages of education, and the facilities given by Institutions of the kind which they were met to support, for extending and promulgating its existence.

MEETINGS FOR THE ENSUING WEEK.

Mon. Royal Inst., 2, General Monthly Meeting.
London Inst., 7, Dr. Edwin Lankester, "On the Recent Progress of Vegetable Physiology."
Chemical, 8. 1. Professor Way, "On New Methods of Determining Minute Quantities of Nitric Acid and Ammonia;" 2. Messrs. Abel and Bloxam, "Contributions to the Chemical History of Nitric Acid."
Entomological, 8.
Tues. Royal Inst., 3, Professor Huxley, "On Physiology and Comparative Anatomy."
Syro-Egyptian, 7½. 1. Mr. Bonomi, "On the Temples of Egypt;" 2. Dr. Bell, "On Lepsius' Chronology of the Apis;" 3. Mr. Purland, "On Comparative Hieroglyphic Interpretation."
Civil Engineers, 8, Mr. C. R. Drysdale, "On Steep Gradients of Railways, and the Locomotives Employed."
Medical and Chirurgical, 8½.
Zoological, 9.
Wed. London Inst., 3, Prof. Rymer Jones, "On Entomology and the General Organisation and Metamorphoses of Insects."
Literary Fund, 3.
Society of Arts, 8, Mr. James Wilson, "On the Manufacture of Articles from Steel."
Geological, 8. 1. Mr. S. H. Beckles, "On the Strata in the Cliffs at Hastings;" 2. "Mr. J. S. Wilson, "On the Geology of Sydney, Australia;" 3. Dr. Wright, "On the Stratigraphical Relations of the so-called Sands of the Inferior Oolite;" 4. M. A. Boué, "On the Probable Origin of the Dover Straits by Means of a Fissure;" 5. Dr. Croker, "On the Rocks and Lignites of Bovey Tracey, Devonshire."
Graphic, 8.
Royal Society, Literature, 8½.
Thurs. Royal Inst., 3, Prof. Tyndall, "On Light."
Antiquaries, 8.
Royal, 8½.
Fri. Astronomical, 8.
Philological, 8.
Royal Inst., 8½, Mr. C. W. Siemens, "On a New Steam Engine."
Sat. London Inst., 3, Mr. E. W. Brayley, "On Geology."
Royal Inst., 3, "Dr. A. W. Hofman, "On the Non-Metallic Elements; their Manufacture and Application."
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 14, 15, 17, 18, 20, 22, 27, 28, 29, *and* 31 *March*, 1856.

Par. No.
74. Duchy of Lancaster—Account.
87. Fees on Baronetcies, &c.—Return.
90 (1). Civil Services Estimates—Class 1.
92. Masters (Navy)—Nominal Return.
98. Committee of Selection—3rd Report.
96. Clerks of the Parliaments—Copies of Patents.
97. Schools in Rural Districts—Return.
90 (1). Civil Services Estimates—Plans referred to in Class 1.
90 (3). Civil Services Estimates—Class 3.
95. Procurators Fiscal, &c. (Scotland)—Return.
23. Prisoners for Debt, &c.—Abstract of Return.
94. Wool and Woollen Manufactures—Returns.
105. Army (Crimea)—Nominal Return.
41. Local Acts (17, Lowestoft and Beccles Railway; 18, Bournemouth Improvement and Pier; 19, Aberdeen, Peterhead, and Fraserburgh Railway; 19 (a), Poole and Bourne Valley Railway—Sittingbourne and Sheerness Railway—Thames Embankment and Railway—Admiralty Reports.
78. Court of Chancery (Ireland)—Return.
100. Isle of Man (Ecclesiastical and Civil Offices, &c.—Returns.

101. Supernumeraries (Ireland)—Return.
102. East India (Oude)—Return.
82. East India (Annexation of Berar)—Correspondence.
99. Metropolitan Improvements—Statements.
103. Convicts (Orders of License, &c.)—Return.
104. East India—Territorial Accounts.
88. National School (Belfast)—Correspondence.
106. Formation, &c., of Parishes Bill—Minutes of Evidence, &c.
71. Bills—Police (Counties and Boroughs) (amended.)
70. Bills—Reformatory Schools (Scotland) (amended.)
69. Bills—Commissioners of Supply (Scotland) (amended.)
72. Bills—Formation, &c., of Parishes (as amended by the Select Committee.)
74. Bills—Wills and Administrations.
Commissary General Filder—Copy of a Letter.
Church Estates Commissioners—5th General Report.
Statute Law Commmission—2nd Report.
Turnpike Trusts—1st Report by the Secretary of State.
Paris Universal Exhibition—Reports, Part 1.
Prisons—16th Report of Inspectors (Home District), Part 1.
Post Office—2nd Report of the Postmaster General.
Colonial Possessions—Reports.
Prisons (Scotland)—17th Report of the General Board of Directors.
Swiss Confederation—Treaty of Friendship, Commerce, &c.
Committee of Council on Education—Financial and other Tables.

Session 1854-55.

516. Pilotage—Return.

Delivered on 1st April, 1856.

39 (2). Trade and Navigation Accounts (29 February, 1856.)
90 (4). Civil Services Estimates—Class 4.
63. Bills—Advowsons.
68. Bills—Aggravated Assaults.
73. Bills—Cambridge University.

Delivered on 2nd April, 1856.

61. Bill—Bankruptcy and Insolvency (Ireland).
Public General Acts—Cap. 7, 8, 9, and 10.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette March 21st*, 1856.]

Dated 4th March, 1856.

553. George Lodge, sen., John Ogden, and George Lodge, jun., Leeds—Improved apparatus for effecting the consumption of smoke in steam boiler and other furnaces.

Dated 5th March, 1856.

555. Richard Dugdale Kay, Accrington—Improvements in the manufacture of fabrics from fibrous materials.
557. Samuel Last, Oxford-street—Improvements in trunks or portmanteaus, and an improved lock for the same.
559. William Green, York-street, City-road—Improvements in ornamenting and waterproofing fabrics.

Dated 6th March, 1856.

560. Thomas Beatt Sharp and Thomas Forsyth, Atlas Works, Manchester—Improvements in coupling railway rolling stock.
562. Henry Davis Pochin, Salford—Improvements in the manufacture of aluminous and siliceous compounds.
563. Richard Philp, Suffolk-parade, Cheltenham—Improvements in paddle-wheels for propelling vessels in water.
565. Robert Morrison, Newcastle-upon-Tyne—Improvements in pile-driving machinery.
566. Benjamin Browne, Stockwell—Improvements in the construction of spindles for locks and latches, and in the mode of connecting the same thereto, and to their respective knobs.
567. Auguste Neuburger, 39, Rue de l'Echiquier, Paris—Extraction of oil from a vegetable substance not hitherto so used.
568. John William Scott, Worcester—An apparatus for fastening or securing buttons, which may itself be used as a stud or button.
569. Richard Archibald Brooman, 166, Fleet-street—Improved method of creating a vacuum, together with certain arrangements of apparatus for preserving substances liable to injury or corruption from prolonged exposure to the atmosphere. (A communication.)

Dated 7th March, 1856.

570. John Downie, Glasgow—Improvements in moulding or shaping metals, and other materials.
571. Chevalier Guillaume Hahner, Leghorn—Improvements in the treatment of ores. (A communication.)
572. David Brown and William Brown, Smethwick—Improvements in rolling railway switches from railway bars, and in rolling taper ends or other bars requiring the same.
573. Frederick Hale Holmes, London—Improvements in machines known under the name of magneto-electric machines.

Dated 8th March, 1856.

574. Thomas Cook, Lieut., R.N., Addiscombe—Improvements in portable bedsteads.
575. Henry B. Young, Barnstaple—Improvements in steam engines.
576. Henry Cooke, Manchester—Improved machinery or apparatus for dyeing and dressing yarns or threads.
577. Jean Jules Robert, 18, Portugal-street, Lincoln's-inn-fields—A process which extracts the greasy particles contained in the waters after the cleansing of wools, by the means of sulphate of zinc and arsenicous acid.
578. David Yoolow Stewart, Glasgow—Improvements in moulding or shaping metals.

Dated 10th March, 1856.

580. Leon Chablin and Antoine Hennique, 39, Rue de l'Echiquier, Paris—A new mode of ornamenting ceramic and vitreous products.
582. Pierre Hippolyte Gustave Bérard, Paris—Improvements in manufacturing artificial flowers and foliage.
584. James Mills, Oldham—Improvement in spindles used in certain machines for preparing, spinning, and doubling cotton and other fibrous substances.
586. Joseph Davy, Manningham, near Bradford, and John Milnes, Clayton West, near Huddersfield—Improvements in looms for weaving plaids, plain weaving, and flounces, or other ground-work.

Dated 11th March, 1856.

590. Oliver Maggs, Bourton Foundry, Dorset—Improvements in the straw shaking apparatus of thrashing machines.
592. John Fowler, jun., Havering, near Romford—Improvement in the manufacture of bricks and tiles.

INVENTION WITH COMPLETE SPECIFICATION FILED.

614. William McCarton, 21, Clarence-place, Dublin—Improvements in the drying of corn or grain for grinding and preserving and apparatus for performing same, and is applicable to drying of other seeds.—13th March, 1856.

[*From Gazette March 28th*, 1856.]

Dated 6th March, 1856.

561. Luke Duncan Jackson, 3, Alfred-place, Alfred-road, and Henry Myers, 51, Alfred-road, Paddington—The combining air and water as a power.

Dated 10th March, 1856.

579. Robert Hannah, Glasgow—Improvements in pottery kilns.
581. Pierre Denis Nolet, Rue de la Lune, Paris—Improvements in pen-holders.
583. Robert Smith Bartleet, Redditch—Improvements in cases or holders for machine and other sewing needles.
585. Francis Joseph Emery, Cobridge—Improved means of arresting the descent of cages or corves in the shafts of mines which may also be applied to stopping the fall of weights.

Dated 11th March, 1856.

587. Alexandre Tolhausen, 7, Duke-street, Adelphi—Improvements applicable to bakers' ovens. (A communication.)
589. Henri Greene, Windlesham, near Bagshot—Improvements in locomotive engines and carriages running on railways. (A communication.)
591. Henry Petitpierre, 15, Avenue de St. Ouen, Batignolles, near Paris—Improvements in sawing or cutting stone.

Dated 12th March, 1856.

593. Henry Horner and Richard Bagley, Sheffield—Improvements in buffers and draw and bearing springs for railway and other purposes.
594. George Spencer, 6, Cannon-street—Improvements in supporting the rails of railways.
595. John Martin Stanley, George Bellamy, and William Booth, Sheffield—Improvements in the manufacture of rolls for rolling steel, copper, lead, or other malleable material.
596. Christopher Richard Norris Palmer, Strand—A new telegraph and improved telegraph or signal apparatus, parts of the invention, apparatus, or manufacture being applicable to other purposes.
597. John Vigars, Marytavy, near Tavistock—Improvements in machinery for lifting in mines, also applicable to other purposes.
598. Edmund Alfred Pontifex, Shoe lane—Improvements in the manufacture of tartaric and citric acids, and tartrate of potash and soda.
599. Liphar Mathurin Chalange, Nogent-sur-Seine, France—Improvements in corn-mills.
600. William Corbitt and George Shaw, Masbro' Works, Rotherham—Improvements in buffer bearing and draw springs for railway and other carriages.
601. Frederic Howorth Edwards, Newcastle-upon-Tyne—Improvements in railway brakes.
602. William Bramwell Hayes, Manchester—Improvements in looms for weaving.
603. John Northcote Ryder, Thames-street—Improvement in the slide valves of steam engines.
604. George Murray, Whitehill Point, Northumberland—Improvement in the construction and manufacture of wheels for locomotive engines, waggons and other carriages to be used on railways.
605. Thomas W. Taylor, Cannelton, Perry, U.S.—Improvement in flying or roving frames.

Dated 13th March, 1856.

607. Pierre Hippolyte Gustave Bérard, Paris—Improvements in the manufacture of waterproof fabrics, which improvements may also be applied for rendering other substances waterproof.
608. Joseph Sturge, Kennington, and Alfred Sturge, Northfleet—Improvements in rotary fluid meters.

609. George Rees, Clerkenwell—Improved method of producing figured or ornamental surfaces on glass.
610. Isaac Dixon, Liverpool—Improved propeller for steam ships and other vessels.
611. Grand de Chateauneuf, 39, Rue de l'Echiquier, Paris—A hydropneumometric gas meter.
612. Thomas Porter, Manchester—Improvements in looms for weaving carpets, coach-lace, velvets, and other piled fabrics. (A communication.)
613. James Murdoch, 7, Staple-inn—Improved mode of manufacturing cut velvets and other similar fabrics. (A communication.)

Dated 14*th March*, 1856.

615. Prosper Pimont, Rouen—A certain process for restoring metallic spoiled pens.
616. Charles Durand Gardissal, 10, Bedford-street, Strand—Improvement in capstans. (A communication.)
617. Charles Durand Gardissal, 10, Bedford-street, Strand—Improvement in ships' windlasses. (A communication.)
618. Philip Marcus, Well-street—An apparatus for working the damper in steam-engine furnaces. (A communication.)
619. William Yates, Bromley, Middlesex—Improvement in furnaces.
620. William Clay, Liverpool—Improvements in the manufacture of the points or switches and crossings of railways.
621. William Edward Newton, 66, Chancery-lane—Improved machinery for separating gold and other metals from their ores. (A communication.)

Dated 15*th March*, 1856.

622. Charles Coates, Sunnyside, near Rawtenstall—Improvements in apparatus for communicating motion to machinery used in bleaching, printing, dying, and finishing fabrics.
623. Louis Joseph Richard, Tirlemont, Belgium—Improvements in sugar manufacture.
624. Joseph Benjamin Hawkins, Reading—Improvements in couches or sofas, parts of which are applicable to other like furniture.
625. Edwin Thomas Wright, Wolverhampton—Improvements in the manufacture of steam-engine boilers, iron ships and boats, and such other vessels and things as are or may be made by rivetting together metal plates.
626. Robert Walter Winfield, Birmingham, and John Simms, Fleet-street, and Thomas Lloyd, King's Norton—Improvements in the construction and ornamentation of metallic bedsteadss and other articles of metallic furniture.
627. James Rice, Foley-place, and William Rice, Lieutenant H.E.I.C.S.—Improvements in breech-loading repeating gun and rifles.
628. Joseph Dumas, Marseilles—Improved description of tile. (A communication.)
629. William Oldham, Southam, Warwick—Improvements in the manufacture of cement.
630. Henry Bessemer, Queen-street-place, New Cannon-street—Improvements in the manufacture of iron and steel.
631. Charles Randolph and John Elder, Glasgow—Improvements in marine engines.
632. Joseph Pegg, Monk Wearmouth—Improved steering apparatus.

Dated March 17*th*, 1856.

633. John Mitchell, Dunnings-alley, Bishopsgate-street Without—Improvements in apparatus for washing and amalgamating ores and other matters.
635. Charles Benjamin Normand, Havre—Improvements in the treatment and employment of steam in steam engines, and in apparatus for effecting the condensation of steam.
637. Thomas Palmer, Tavistock—Pumps, with a new or improved box and valve.
639. William Graham, Glasgow—Improvements in marine compasses, and in adjusting the same on board ship.

Dated 18*th March* 1856.

641. Peter de Prades, Camden New-town—Improvements in wheelbarrows.
643. Edward Rowley, West Bromwich, and John Hadley, Birmingham—Improved method of shaping iron.
645. John Drury, Paddock, near Huddersfield—Improvements in steam boilers for preventing explosion thereof.
647. Harby Barber, Belgrave, near Leicester—Improvements in the manufacture of hosiery goods.
649. Peter Appleton, 7, London-street, New Swindon—Improvements in knives for peeling apples, potatoes, and other fruits and roots.

INVENTION WITH COMPLETE SPECIFICATION FILED.

650. Lazare Ochs, St. Josse ten Noode, Belgium—Improvements in the manufacture of certain kinds of paper from the refuse of tanned leather. (A communication.)—19th March, 1856.

WEEKLY LIST OF PATENTS SEALED.

Sealed March 20th, 1856.

2131. Henry James Harcourt.
2134. John Musto and Frederick Bear.
2138. William Wright and John Wright.
2144. Gustavus Huguenin.
2148. James Nasmyth.
2153. Anaxagoras Epaminondas Guilbert and Charles Louis Guillemère.
2162. John Talbot Pitman.
2336. Samuel Statham.
2342. William Tatham.
2456. James Smith Cottrill.
2554. William Webb and John Webb, junr., and James Catstree.
2874. Henry Robert Abraham.
2924. David McCallum.
2928. Alfred Krupp.
42. William Oliver Johnston.
50. Conrad Abben Hanson and John Wormald.
64. Samuel Middleton.
120. John Fowler, junr.
122. Henry R. Worthington.
182. Archibald Turner.
232. John Whitehead.

Sealed March 25th, 1856.

2161. William David Gray.
2170. Henry Bernoulli Barlow.
2173. David Chadwick, Herbert Frost, George Hanson, and John Chadwick.
2181. Auguste Edouard Loradoux Bellford.
2192. Alexander Sands.
2214. John Lancaster.
2234. Adolph Coutinho.
2255. Julien François Belleville.
2289. Hugh Greaves.
2296. George Tomlinson Bousfield.
2298. George Tomlinson Bousfield.
2363. Vincent Scully and Bennett Johns Heywood.
2372. William Shears.
2386. Alfred Ardouin.
2395. Edwin Pugh.
2403. Peter Cranke Wood.
2429. Thomas James Swinburne.
2446 Edwin Thomas Truman.
2509. William Lund and Alexander Bain.
2825. Alfred Krupp.
2853. William Hemsley.
2861. Christopher Nickels and James Hobson.
2957. James Cochran Stevenson and John Williamson.
27. John Fowler, junr.
56. Alfred Vincent Newton.
214. Jean Louis Ambroise Huillard.

Sealed April 1st, 1856.

1376. James Lowe.
2186. Joseph François Victor Augier.
2187. George Baker and Charles Miller.
2191. John Riddel Musgrave, Robert Musgrave, and James Musgrave.
2194. Laurent Marie René Péan.
2195. George Rennie.
2198. Julian Bernard.
2209. Robert Wilkinson.
2216. Thomas Henry Ryland.
2223. François Modeste Demait.
2224. Peter Alexander Halkett.
2233. William John Roffe.
2258. Stephan Goldner.
2290. Germain Adolphe Thibierge.
2313. William Edward Newton.
2341. John Smith.
2343. William Armand Gilbee.
2351. Pierre Arnaud Massip.
2353. Nathaniel Shattswell Dodge.
2392. Thomas Beatt Sharp and Richard Furnival.
2422. Jules Jean Baptiste Sylvain Martin de Lignac.
2430. Thomas Shipp Grimwade.
2473. Robert Spring Garden.
2497. Charles Hanson.
2504. Louis Benoit Advielle.
2571. Alfred Vincent Newton.
2595. Robert Walter Swinburne.
2617. Edward Orange Wildman Whitehouse.
2683. Charles Jean Baptiste Barbier.
37. Joseph Wright.
67. Frederick Albert Gatty.
92. Harry Emanuel.
101. Nathaniel Shattswell Dodge.
141. Nathaniel Shattswell Dodge.
194. David Fisher.
251. Alfred Vincent Newton.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

March 18*th*.

685. Samuel Radcliffe and Knight William Whitehead.
710. William Mann Crossland.
927. Isaac Simpson.

March 19th.

698. Samuel McCormick.
739. Samuel Fox.
775. George Fergusson Wilson and James Freeman Lee.
776. George Fergusson Wilson.
779. William Crofts.
783. George Fergusson Wilson.
784. George Fergusson Wilson.
785. George Fergusson Wilson.

March 20*th*.

689. Thomas Sykes.
712. Charles William Siemens and Joseph Adamson.
792. Frederick Wm. Mowbray.
915. Jean Baptiste Maniquet.

March 22*nd*.

721. William McNaught.

March 24*th*.

859. William Penn Cresson.
890. James Noble.
894. James Noble.
974. Cyprien Marie Tessie du Motay.
985. George Fergusson Wilson, William Henry Hatcher, and John Jackson.

March 25*th*.

732. James Worrall, jun.

March 26*th*.

737. Thomas James Perry.
773. George Hanson and David Chadwick.

March 27*th*.

740. George Edward Dering.
741. George Edward Dering.
744. Luke Smith and Matthew Smith.
763. Christopher Nickels.

March 28*th*.

757. Julian Bernard.

March 29*th*.

750. Laurence Frederick Keogh.
797. William Beckett Johnson.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3822	March 28.	Glass Instrument for Measuring the Density of Fluids	Negretti and Zambra	Hatton Garden.
3823	March 28.	Portable Heater or Boiler	Charles Ford	Hanley.